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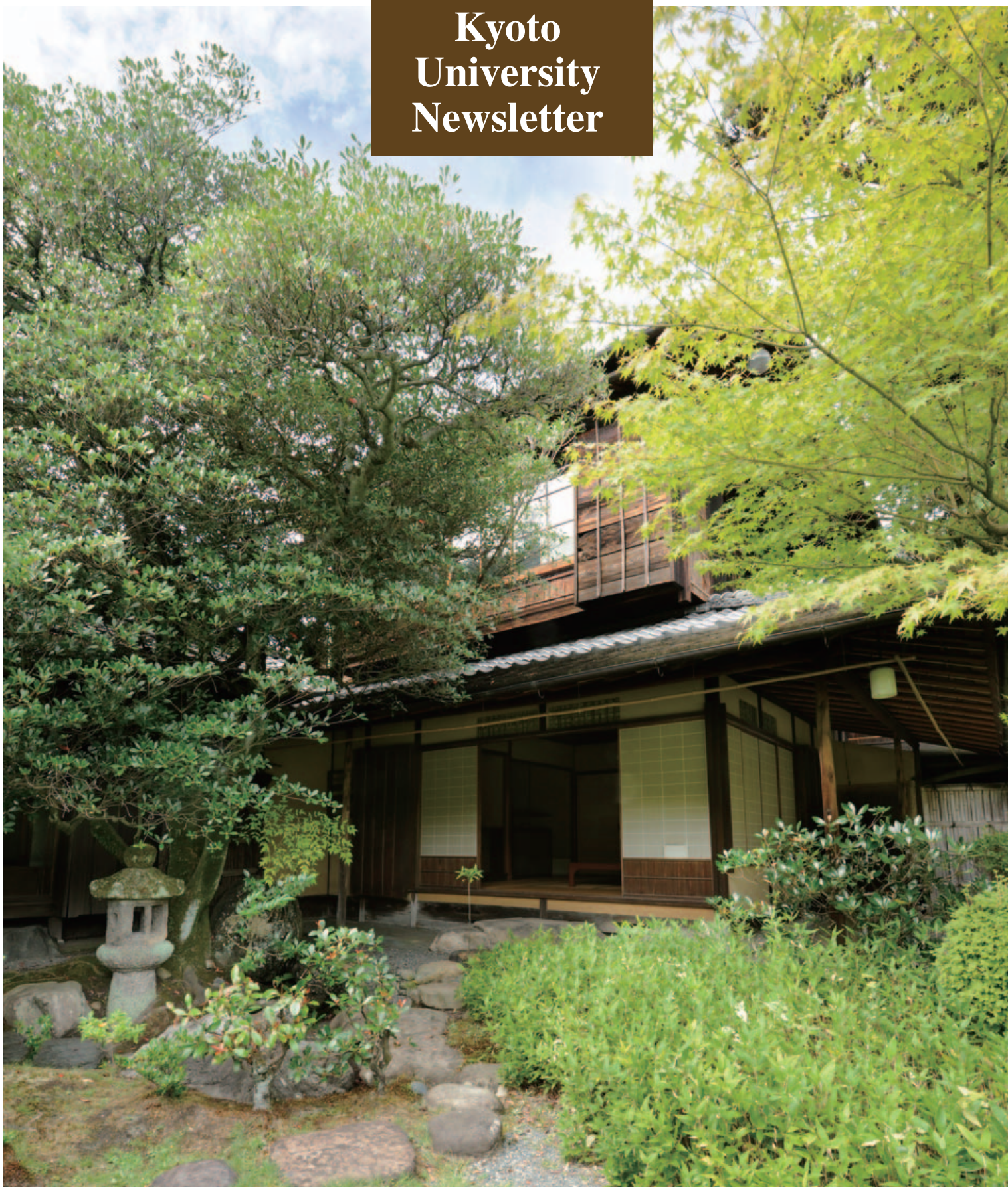
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楽友
Raku-Yu

Kyoto
University
Newsletter



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Editor's Notes

In the last issue, no. 17 of *Raku-yu*, we featured a dialogue between the *Raku-yu* staff and Kyoto University President Hiroshi Matsumoto and also with Professor Shinya Yamanaka, the world's leading researcher into induced pluripotent stem cells (iPS cells). In this issue, we look at the launching of the new Center for iPS Cell Research and Application (CiRA). We also interview Dr. Yuuki Kawabata, who is one of the main proponents of “MANGA Kyoto University”, which was featured in the last issue. On the other hand, our new project called “*Hakubi* Project” to foster and support young researchers is a new topic of this issue. This is a project newly inaugurated in AY 2009 and we reported a general structure of this project. In future issues we will continue to inform readers of the achievements not only of this project but also about other projects as well.

Cover Photo: Seifu-so

On its approximately 12,000m² premises, *Seifu-so* is equipped with a tea ceremony room built in the end of the Edo period, *sukiya* (tea ceremony cottage)-style buildings such as the detached house and main house constructed in the Taisho period, and a Japanese-style garden arranged with artificial hills and a pond that imitate the environment of Lake Biwa. Those *sukiya*-style buildings are registered tangible cultural properties of Japan.

Seifu-so was originally built in 1732, which is the birth place of Kinmochi Saionji (1849–1940), an important politician in pre-war Japan, who was twice inaugurated as Japan's prime minister. Afterward, his younger brother, Tomozumi Sumitomo, inherited the property, made a total renovation of the buildings and garden, and offered Kinmochi the property as his detached residence in Kyoto. After Kinmochi passed away, the property was managed by the Sumitomo family, and was subsequently donated to the present owner, Kyoto University. The buildings, in which Kinmochi once entertained many privileged guests, stand in a quiet atmosphere that is surprising for a location facing a highway.



Tea-ceremony room



Guest room of the main house



View of the garden from the main house

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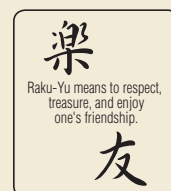
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A Note on Order of Names
As a general rule, names appearing in *Raku-Yu* are written in given name/family name order.



This name was taken from the assembly hall called “*Raku-Yu Kaikan*” that commemorated the 25th anniversary of the founding of Kyoto University.

Hiroshi MATSUMOTO Since his installation as President of Kyoto University, Dr. Hiroshi Matsumoto has promoted friendships with presidents from many other universities in various parts of the world. The encounters have made him acutely aware that universities are now involved in more intense global competition even as they seek to advance international cooperation. "Many universities abroad are extremely eager to bring in international students/researchers through academic and research collaboration agreements and academic credit exchange agreements," President Matsumoto said. He added: "At Kyoto University, however, we started international programs only quite recently."

To facilitate and speed up the decision-making processes involving internationalization, he has pushed for the university to undertake major structural reforms. He has encouraged board members to engage in open discussions that would go beyond the boundaries of their respective formal roles, all in the effort to put the university in a good position to achieve its ideal vision for the 21st century. President Matsumoto has also been exerting his extraordinary leadership in various international programs, notably the K.U.PROFILE Programs (Kyoto University Programs for Future International Leaders), establishment of the London Office of Kyoto University and the inauguration of the *Hakubi* Project. "I believe that only the individuals with self-confidence and self-respect can contribute to international relationship. With this in mind, I am working to create an ideal educational and research environment that may nourish self-pride and self-motivation in the minds of students, faculty members and staff members." Looking ahead to ten or even twenty years from now, President Matsumoto hopes that his efforts to truly internationalize the university will bear fruition.



Mottainai (勿体無), Mittomonai (知恥), Katajikenai (忝)

Today, we are confronted with numerous urgent global challenges from global warming, to the population explosion, to the rapid depletion of resources. The emergence of these problems is an inevitable result of the endless pursuit of economic growth and the never ending human demand for a better life. To overcome or mitigate such impending global threats, it will not suffice to rely solely on scientific and technological innovations, as is our tendency. Our efforts will also need the wisdom of the humanities and social sciences. We have arrived at a juncture of human development where we must share the wealth of wisdom accumulated by all human civilizations and create a new body of knowledge in order not only to survive, but also to realize and sustain a harmonious global society on planet Earth.

Some readers may be confused when I say we need "wisdom for survival," as we are not currently in the midst of a world-scale conflict or other such immediately apparent violent upheaval. However, a growing number of people are beginning to realize that these various and rapidly encroaching global environmental and economic issues represent an equivalent danger, and the excessive consumption and production in certain parts of the world—in search for the constant reaching for what is perceived as "a better and richer life"—are causing a myriad of problems which can no longer be ignored or treated lightly. When I say that we need "wisdom for survival," therefore, I am asserting that inputs from the humanities and social science

fields will be indispensable in tackling the world's problems and moving forward towards a sustainable, harmonious global society.

The well-known Japanese phrase "*Mottainai* (勿体無), *Mittomonai* (知恥), *Katajikenai* (忝)" can be roughly translated into English as "prudence, self-respect and gratitude." The phrase expresses three fundamental virtues, which have been traditionally valued in Japan and many other Asian countries. I like to refer to the combination of these three values as "the MMK philosophy." Unfortunately, however, it seems that in modern times these values have fallen by the wayside. In fact, I would go so far as to say that a distorted MMK philosophy reflecting today's materialistic times could be read as, "*Motto* (更), *Mada-mada* (未), *Katanakuchya* (必勝)" — "more, never enough, must win!"

It is my opinion that the survival of the human race and the creation of a harmonious future for our world will require a return to the humble but noble virtues of the traditional MMK philosophy. To achieve this I believe that we must look to the accumulated wisdom of the humanities and social sciences for guidance.

A handwritten signature in black ink that reads "H. Matsumoto". The signature is fluid and cursive, with the first name 'H.' and last name 'Matsumoto' clearly distinguishable.

Hiroshi MATSUMOTO
President of Kyoto University

Toward a new vision of the world through integrative area studies of contemporary India: The launching of the Center for the Study of Contemporary India

The Center for the Study of Contemporary India was established at the Graduate School of Asian and African Area Studies (ASAFAS), Kyoto University in April 2010. It serves as the Hub Research Center in the Contemporary India Area Studies Program (INDAS), which was launched by National Institutes for the Humanities (NIHU). This research project will be conducted, in collaboration with NIHU, by the INDAS Network, which consists of six Research Centers: Kyoto University, The University of Tokyo, Hiroshima University, National Museum of Ethnology, Tokyo University of Foreign Studies and Ryukoku University. At Kyoto University, there are also the Center for Islamic Area Studies at ASAFAS, and the Research Center for Modern and Contemporary China at the

Institute for Research in Humanities, both supported by NIHU.

The Center aims to develop a comprehensive understanding of the present dynamism of India from a holistic and long-term perspective. It also aims to establish research networks in Japan and abroad in order to construct the organizational basis necessary to develop Contemporary India Area Studies. We have set out the following six important agendas for our activities:

1. Interdisciplinary approach: To conduct a wide range of interdisciplinary studies on Contemporary India by combining the perspectives and methodologies of the social sciences, humanities and natural sciences.

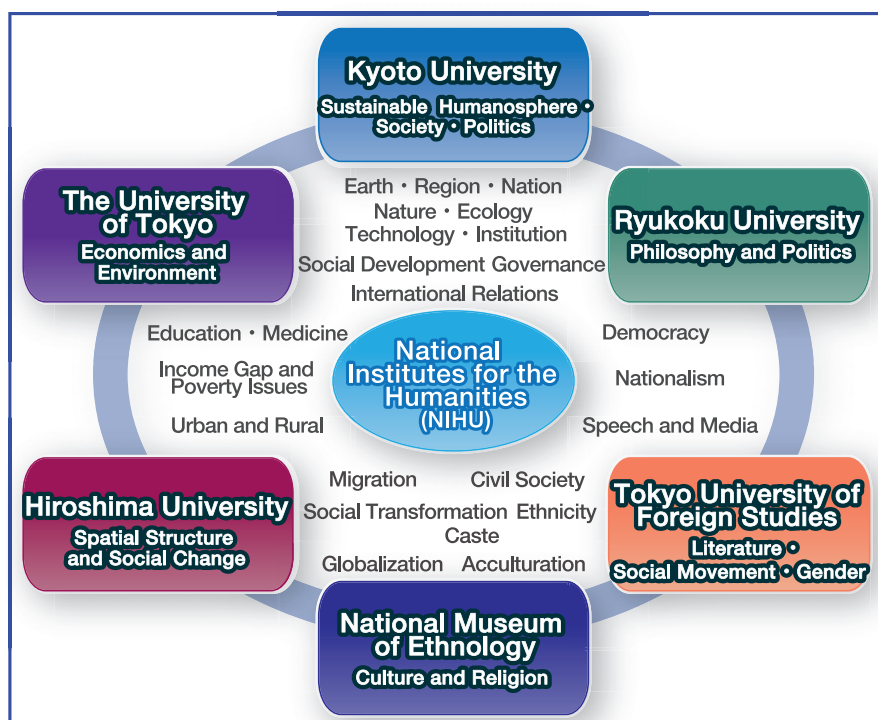
2. Establishment of research networks in Japan: To develop well-organized research networks on Contemporary India in Japan.

3. International collaboration: To further develop the mutual exchanges among researchers on Contemporary India in Japan and abroad.

4. Training young scholars: To foster the next generation of young scholars who can actively and globally engage in Contemporary India Area Studies.

5. Building research infrastructure: To develop an infrastructure of Contemporary India Area Studies by collecting documents, visual and museum materials, and preparing spatial information database.

6. Promoting academic-social networks and enhancing public opinion: To deepen mutual exchanges between academic institutions and international organizations, NGOs, and private companies, and to contribute towards creating more informed public opinion on India and Japan-India relationships.



In sum, the aim of the Center and INDAS is to understand the historical context of the contemporary dynamism of India through “long-term” perspectives, to develop “holistic” understanding of India through an interdisciplinary approach combining politico-economic, socio-cultural and ecological-environmental viewpoints, and to understand the place of India in the global world through the “comparative and connective” approach.

We adopt the following three research methods in order to understand the dynamics of contemporary India and its future prospects:

1. We pursue a holistic understanding of contemporary India while paying sufficient attention to its diversity. For



this purpose, we will also strive to integrate macro and micro perspectives as well as quantitative and qualitative approaches.

2. We aim to understand the dynamics of contemporary India and its future prospects in their historical depth. We will likewise establish a long term perspective that connects the past and the present by combining the disciplines of the humanities and social sciences, as well as the methodologies of fieldwork and text analysis.

3. We attempt to understand India and South Asia in their natural and human aspects. We aim to establish “integrated area studies” of India and South Asia, which will analyze nature, ecology, history, culture, politics, economy and society as a whole by integrating the disciplines of the natural sciences, social sciences and humanities.

In order to fulfill our aim, it is necessary to create truly integrated area studies of contemporary India by

promoting interdisciplinary interactions and creating cooperation and coordination of all concerned researchers through the INDAS Network of six Research Centers. We sincerely request for your kind assistance and active participation in the activities of our Center and INDAS project.



Akio TANABE

- Born in 1964
- Field of specialization: Historical Anthropology, Area Studies of South Asia
- Ph.D., Graduate School of Arts and Sciences, the University of Tokyo
- Professor, the Graduate School of Asian and African Area Studies, Kyoto University
- URL <http://www.asafas.kyoto-u.ac.jp/asia/renkan/tanabe/index.html>

Through studies of contemporary India, I would like to present ideas that help forge visions of a “better world” for all.

Professor Akio Tanabe left Japan for the United Kingdom in the summer of 1981, when he was in the second year of his senior high school. Overriding the opposition of his parents and his school principal, he entered Atlantic College in the UK. Fed up with Japan's cramming educational system, he was attracted by Atlantic College's philosophy of promoting international understanding. His decision to go to the UK was also influenced by his earlier experiences when he lived in the United States where he spent a year as a sixth

grader. “We lived in a district where there were many Jewish people,” he said. “Though I was a kid and had lots of fun there, I recognized subtle feelings against Jewish people. I also felt that I was sometimes treated differently. Through this experience, I learned that there are many different cultures in the world and that rather than discriminate against people on the ground of cultural differences, we should learn about diverse cultures and appreciate their differences.”

While he was attending Atlantic College, he visited India for about a month in a student-exchange program. Overwhelmed by the boundless depth of Indian civilization, he realized that his view of the world had been primarily based on Western and Japanese viewpoints. Based on this awareness, he began to pursue ways to build a society where people of diverse cultural backgrounds and different values can live in harmony, respecting each other. After returning to Japan, he entered a university to study diverse subjects, including law, sociology and political science. “I always tried to study these subjects from the viewpoints of people, rather than the state,” he said. He majored in anthropology at graduate



school so that he could engage in fieldwork and learn about various issues through firsthand experiences. He focused his research on India, the country that had influenced his life tremendously since his first visit there. “India has constantly nourished its culture and ideas by promoting exchange and mutual stimulation among people of different backgrounds. I believe that our mission at the Center for the Study of Contemporary India is to demonstrate the global significance of Indian experiences and prospects for the entire world.” Professor Tanabe's words express his enthusiasm and positive approach about his studies.

Research activities starts at the new research facility of the Center for iPS Cell Research and Application (CiRA)



CiRA's logo

In 2006, my laboratory published the first report on induced pluripotent stem (iPS) cells in mice, followed by the successful generation of human iPS cells the following year. Two months later, Kyoto University established its Center for iPS Cell Research and Application (CiRA) within the Institute for Integrated Cell-Material Sciences (iCeMS), to consolidate and promote Japan's efforts in advancing this technology. To date, the Center's concerns have been focused on basic research, but now the time has come when we can realistically begin to consider and develop approaches to the applications of iPS cells through careful and appropriate preclinical and clinical studies. To facilitate these goals, CiRA became an independent research institute on April 1, 2010.

CiRA's mission is twofold: to conduct research contributing to the development and rapid implementation of iPS cell-based technologies for the benefit of patients with a range of intractable medical conditions, and to function as the world's best iPS cell institute through supporting the stem cell research community. With these goals in mind, we have assembled 18 research groups and ample supporting staff to work side by side in our new research facility that was completed in February 2010.

The 18 laboratories are divided into four departments. The Department of Reprogramming Science, which I lead, conducts basic research, mainly focusing on the development of iPS cell genera-

tion protocols to make clinical-grade iPS cells and evaluation methods to select quality iPS cells. The Department of Cell Growth and Differentiation, led by Prof. Junya TOGUCHIDA, advances the methods to derive iPS cells into functional cells and develops transplantation methods, while the Department of Clinical Application, led by Prof. Tatsutoshi NAKAHATA, generates patient-specific iPS cells to establish disease models, conduct drug compound screening and toxicology tests, and develop new therapies. Finally, the Department of Regulatory Science, which I also lead, discusses relevant regulations by communicating with authorities to provide useful research information so that they can draw out appropriate regulations on iPS cell-based drugs and therapies in the future.

To promote these research activities, the new research building has been equipped with core facilities for animal research and cell processing, and it will serve as home to a full spectrum of translation research, making it possible to move seamlessly from basic scientific laboratories to preclinical and clinical teams. We have moved away from the compartmentalization of traditional university research departments, and embraced an open lab scheme in the building's layouts, providing a research environment designed to foster the timely and collegial exchange of findings and views among all members of CiRA's scientific staff.

We are eager to strengthen our existing relationships with other research institutions inside and



Director:
Professor Shinya YAMANAKA

outside of Kyoto University. In addition, to maximize the return of benefits from the fruits of our research, we have established systems for acquiring and managing intellectual properties derived from research at CiRA.

It is widely believed that iPS cell technology shows great potential for uses in therapies and other medical applications, including drug compound screening, toxicology studies and regenerative medicine such as cell transplantation.

The pace of recent progress in iPS cell research by labs from across the world has been breathtaking at times. As Japan's national center for promoting this area of research, we are confronted with intense competition. For us to sustain this momentum and funding support toward clinical applications, we will need to continue to remain competitive, not only scientifically but also in the arenas of scientific governance and intellectual property. As Director, I will seek to provide the leadership and direction to achieve these aims.



An open laboratory on the 4th floor of the new CiRA research facility

The initiation of the *Hakubi* Project to Foster and Support Young Researchers

In 2009, Kyoto University inaugurated the *Hakubi* Project to Foster and Support Young Researchers. The term *hakubi* (literally “white eyebrows”), comes from ancient China, and refers to prominent figures. Under this Project, the university appoints promising young researchers as special faculty members and supports their research activities in order to help them develop into visionary researchers who will pioneer new paths in their respective academic fields. The ultimate goal of this Project is to foster human resources with superb creativity, broad perspectives and flexible mindset, all essential for pioneering new academic frontiers.

The *Hakubi* Project has the following features:

- The university invites applications from researchers all over the world in all academic fields, including humanities, social sciences and natural sciences. Through rigorous screening, the university then annually appoints up to 20 researchers as special faculty members (associate professor/assistant professor under the annual salary system) basically for five years. These researchers are will be referred to as “Kyoto University *Hakubi* researchers.”

- The university will provide each researcher with an annual research fund amounting to between 1 to 4 million yen. The amount will depend on the content of individual researchers’ research plans.

- All *Hakubi* researchers are officially affiliated with the Kyoto University Young Researcher Development Center, although they conduct their daily research activities basically with their respective host organizations (faculties/schools) within the university. Their affiliation with this Center relieves, *Hakubi* researchers from teaching or administrative obligations so that they can concentrate on their respec-

tive research. The Center holds regular academic seminars, presentation meetings by *Hakubi* researchers and other similar events, to promote exchange among researchers of diverse academic fields and provide them with the opportunities to develop and broaden their perspectives and wealth of knowledge.

The Center’s Program Manager supports *Hakubi* researchers with their research programs throughout their service terms.

- To allow researchers to dedicate themselves fully to their research activities, the university will impose only minimum obligations on *Hakubi* researchers. They will be asked to furnish annual reports on their research activities and give presentations on their research results at the end of their fixed terms. Researchers are not evaluated either during their terms or after their termination.

In the first year of the *Hakubi* Project, the university received 588 applications from within and outside Japan. To screen applicants, a special committee of the

Kyoto University Young Researcher Development Center evaluated these applications. Applicants who passed the first screening were then interviewed by the *Hakuraku* Council comprising of intellectuals from within and outside Kyoto University (*Hakuraku*, originally referred to a person who was a good judge of fine horses, in ancient Chinese literature, is presently used to mean an excellent judge of human resources). At this second screening, applicants were evaluated in terms of their potential to become leading figures in the future global academic community. Finally, the Steering Committee of the Kyoto University Young Researcher Development Center accepted 18 of the applicants.

Appointed Kyoto University *Hakubi* researchers began their respective activities in April 2010 onward, in accordance with their own schedules.

The number of applicants in 2009 and 2010, and those employed in 2009 were as follows:

Employment Data (2009)

Number of applicants		Number accepted		Competition rate	
588		18		32.7 times	
	Number of applicants	Percentages		Number employed	Percentages
Male: Female	458 : 130	77.9% : 22.1%		14 : 4	77.8% : 22.2%
Kyoto Univ.: Others	226 : 362	38.4% : 61.6%		8 : 10	44.4% : 55.6%
Japan: Outside Japan	476 : 112	81.0% : 19.0%		15 : 3	83.3% : 16.7%
Associate Prof: Assistant Prof.	180 : 408	30.6% : 69.4%		7 : 11	38.9% : 61.1%
Average age	(Associate Prof.)			36.9 years old	
	(Assistant Prof.)			30.2 years old	

* Classification based on details of the Proposals written by individual applicants

Data of Applicants (2010)

Number of applicants		Number of applicants		Percentages	
517					
Male: Female		421 : 96		81.4% : 18.6%	
Kyoto Univ.: Others		183 : 334		35.4% : 64.6%	
Japan: Outside Japan		411 : 106		79.5% : 20.5%	
Associate Prof.: Assistant Prof.		160 : 357		30.9% : 69.1%	

* Classification based on details of the Proposals written by individual applicants

Realization of “the heaviest electrons” in two-dimensional space

Materials are classified into two categories; those conducting electricity and those that do not. For example, metals like copper conduct electricity, while on the other hand, semiconductors including silicon and insulators such as paper do not. The properties of materials depend mainly on their electrons. Metals that conduct electricity contain many electrons that move freely. Electrons are in the gas state like water vapor (electron gas) and in metals, they move around at an extremely rapid speed that would enable them, for example, to cross the islands of Japan in just one second (1,000 times or more the speed of a space shuttle). Furthermore, electrons have a negative charge and repeat collisions due to Coulomb interaction, a strong repulsion. Electron gas is clean, pure and uniform, and these characteristics make it the simplest system in the universe. Nevertheless electron gas has very intriguing properties such as superconductivity, where resistance vanishes at ultralow temperature, and ferromagnetism, where materials form a permanent magnet. These two properties remain hot issues today, even though there had been extensive research done about them for a long time now.

The repulsion between electrons is called electron correlation. In almost all metals, the repulsion is actually masked by quantum mechanical effects. Therefore, it may be considered that electrons behave independently like free electrons in a vacuum. However, if electron gas is confined in a low-dimensional space, e.g. a space in which electrons can move back and forth and from side to

side but cannot move vertically (two-dimensional space), unusual physical phenomena often occur, which do not appear in the three-dimensional space that we live in. Furthermore, in strongly correlated electron systems, the repulsion between electrons is not completely screened and various interesting phenomena appear, which are not observed in a system that can disregard repulsion. Behaviors of low-dimensional and strongly correlated electron systems are major issues in physics. Dramatic phenomena occur such as high-temperature superconductivity and fractional quantum Hall effect when an electron gas with strong repulsive force is confined in a two-dimensional space.

Electrons moving around the nucleus are classified into s, p, d and f orbitals in accordance with their angular momentum. We focus on compounds with f orbital with a large angular momentum. These compounds include heavy electron compounds in which strong electron correlation plays an important role. Some rare earth compounds with f orbital especially conduct electricity at a low temperature like metals but strong repulsion between electrons inhibits conduction electrons from moving freely due to a strong repulsion effect, sometimes becoming several hundred-fold heavier in effective mass than free electrons. Such heavy electron compounds

attain the strongest electron correlation in a metallic state. All heavy electron compounds that have been discovered so far have essentially a three-dimensional electron structure. And if heavy electrons are confined in a low dimensional space, it is expected that heavy electrons will provide a novel case of strongly correlated electron system. Our group, formed by the Condensed Matter Group, Department of Physics and the Kyoto University Research Center for Low Temperature and Materials Sciences, has successfully produced an artificial superlattice for the first time in the world by controlling heavy electron compounds using a new molecular beam epitaxy technique (Figure 1). We produced a two-dimensional heavy electron system that does not exist in nature (Figure 2). Many research groups over the world had tried to produce an artificial superlattice of heavy electron compounds, however, none of them succeeded due to technical difficulties.

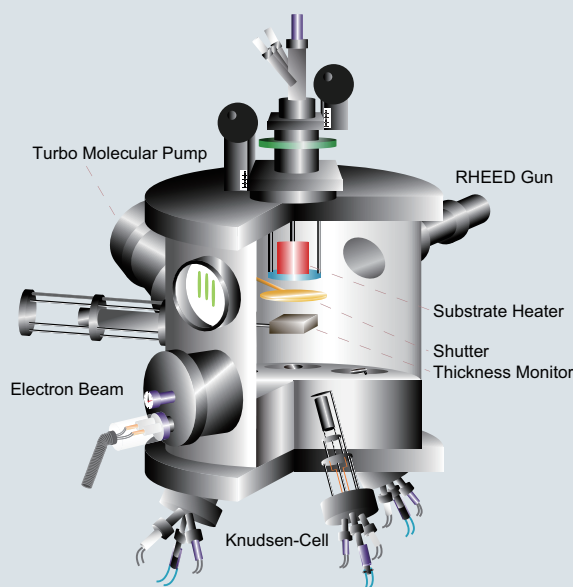


Figure 1: molecular beam epitaxy

It is confirmed that a heavy electron system confined in two-dimensional space becomes nearly 1000-fold heavier at ultra-low temperature than free electrons and shows behavior very different from that of normal metals. Two-dimensional heavy electrons do not currently show superconductivity, but we hope that this artificial superlattice will provide a new mechanism of superconductivity. Furthermore, we intend to develop new devices using a spin, magnetic property specific to electrons, with artificial superlattice of rare earth compounds. We expect that the realization of this artificial superlattice of heavy electrons opens up a new field of study.

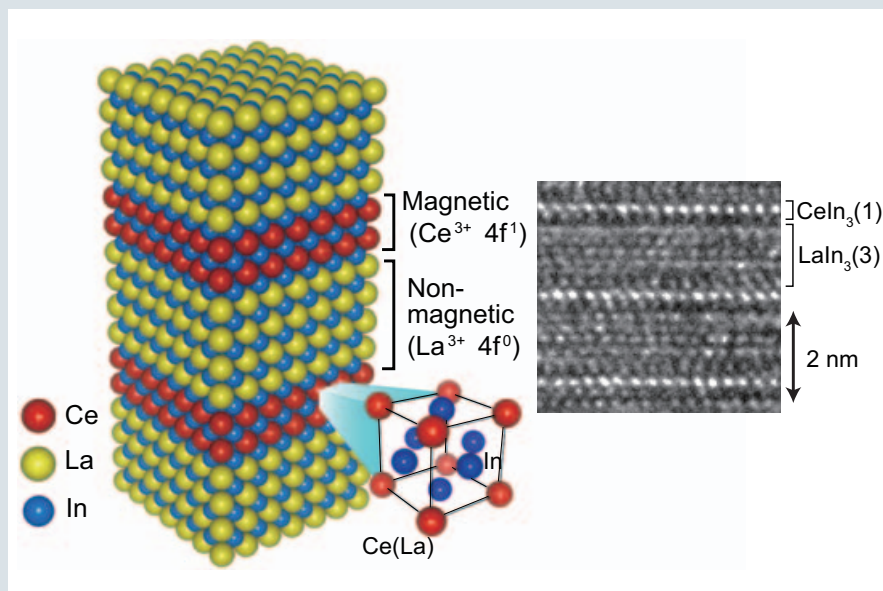


Figure 2: [Left] a scheme of an artificial superlattice of CeIn_3 , a heavy electron system compound containing rare earth element Ce (single f electron) and LaIn_3 , a regular metal compound. [Right] a section by a high-resolution transmission electron microscopy of an artificial superlattice composed by accumulating one layer of CeIn_3 and three layers of LaIn_3 . White spots are Ce elements. In the CeIn_3 layer, heavy electrons are trapped in two-dimensional space.

Yuji MATSUDA

- Born in 1960
- Field of specialization: Condensed Matter Physics
- Completed doctoral program, Graduate School of Science, the University of Tokyo
- Ph.D., the University of Tokyo
- Professor, Graduate School of Science, Kyoto University
- URL <http://kotai2.scphys.kyoto-u.ac.jp/index.php>

The most important key to research is “to enjoy your research.” This provides innovative ideas and sustained energy for effort.

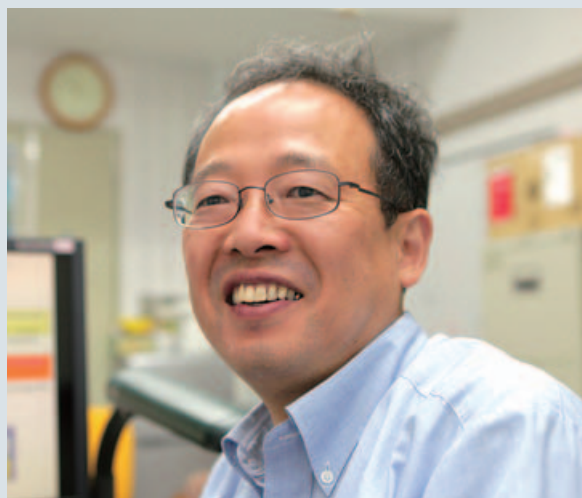
Professor Yuji Matsuda liked making things when he was a boy, and wanted to become an engineer. However, he became interested in physics after entering high school and became involved in the study and research of superconductivity and semiconductors throughout his undergraduate, graduate school and research associate years. He spent 2 years from 1992 at Princeton University as a postdoctoral fellow and his experience there had great impact on his life as a researcher.

“More is different.” He was greatly impressed to hear this phrase while studying at Princeton.

This phrase came from the title of an article proposed by Dr. P.W. Anderson (the 1977 Nobel laureate in physics) who disagreed with the trend in physics at that time to envisage studies on micro elements such as particles as the main concern and base of physics. It means that “if a substance changes in quantity, it changes also in quality.” This dictum underpins the excitement of physics. “For example, helium, the simplest substance in the universe, shows the intriguing phenomenon of superfluidity when it is cooled down. Common sense is overturned, more and more. Not everything can be explained by understanding particles.” Professor Matsuda stresses.

He was greatly impressed with the attitude and energy of researchers in Princeton who aspired to “conduct something new and different from others,” and in the process made the university a world leader in research although its facilities were not the most advanced. Simply considering your research to be “interesting” provides you with unique ideas and devices.

“I realized, ‘major funding does not always support good research.’ So, I often say to my students, ‘It is OK if you think your study is attractive, even though you cannot explain its usefulness.’ Besides, no one knew how useful X-rays and semiconductors were when they were first discovered,” he said. Professor Matsuda’s research group will continue to aspire to come up with innovative outcomes through experiments that are expected to contribute to the elucidation of mechanisms of superconductivity in the future.



A mechanism for inhibiting endogenous retroviruses has been elucidated

Repetitive sequences that do not code for any gene product make up at least 50% of the genomes of mammals including humans. Most repetitive sequences are derived from transposable elements that can move around to different positions within the genome. Endogenous retroviruses (ERVs) are retrotransposable elements with long terminal repeats (LTRs), a family of transposable elements, and make up approximately 8% of the human genome (Figure 1).

Some mouse retrotransposable elements are still active and transposition of ERVs induces approximately 10% of mutations in mice. Organisms have various inhibiting mechanisms to prevent these “selfish” genes from entering and amplifying. DNA methylation is one of such mechanisms and plays an important role in silencing expression of retrovirus (provirus) incorporated into the host’s genome. Proviral expression increases as LTR DNA methylation decreases. On the other hand, in cell lines derived from

early embryos including embryonic carcinoma (EC) and embryonic stem (ES) cells, it was found 30 years ago or more that these cells had a specific DNA-methylation-independent mechanism for silencing proviral expression. The details of the mechanism however remain unclear.

We have showed that lysine methyltransferase ESET/SETDB1 plays a very important role in the proviral silencing mechanism that functions specifically in early embryonic cells (Figure 2). ESET has the activity of methylating a specific histone amino acid (lysine 9 of histone 3: H3K9). Analysis using ES cell system in which the ESET gene was conditionally knocked out indicated that ERV expression was significantly upregulated by ESET deletion. We also showed that H3K9 in LTR-promoter regions of ERVs was ESET-dependently trimethylated. It was likewise confirmed that ESET was introduced to proviral LTR regions by a molecule called KAP1. Furthermore, it was demonstrated that proviral

silencing in ES cells was associated with the activity of ESET histone methyltransferase activity but not required DNA methylation. Taken together we suggest that ESET was involved in proviral silencing independently of DNA methylation in cells of the early embryogenesis, in which DNA methylation drastically changes.

The human body consists of several hundreds of different types of cells including skin cells, cardiomyocytes and hemocytes. With some exceptions, these various cells have the same genomic information, suggesting that genomic information itself is not sufficient for creating such cellular diversities. Histone and DNA methylation play important roles in establishing and maintaining cell-specific gene expression. Biological phenomena are genetically determined although a different level, which is called epigenetic regulation, conducts the regulation of genetic information. In other words, all biological phenomena are genetically and epigenetically regulated. The

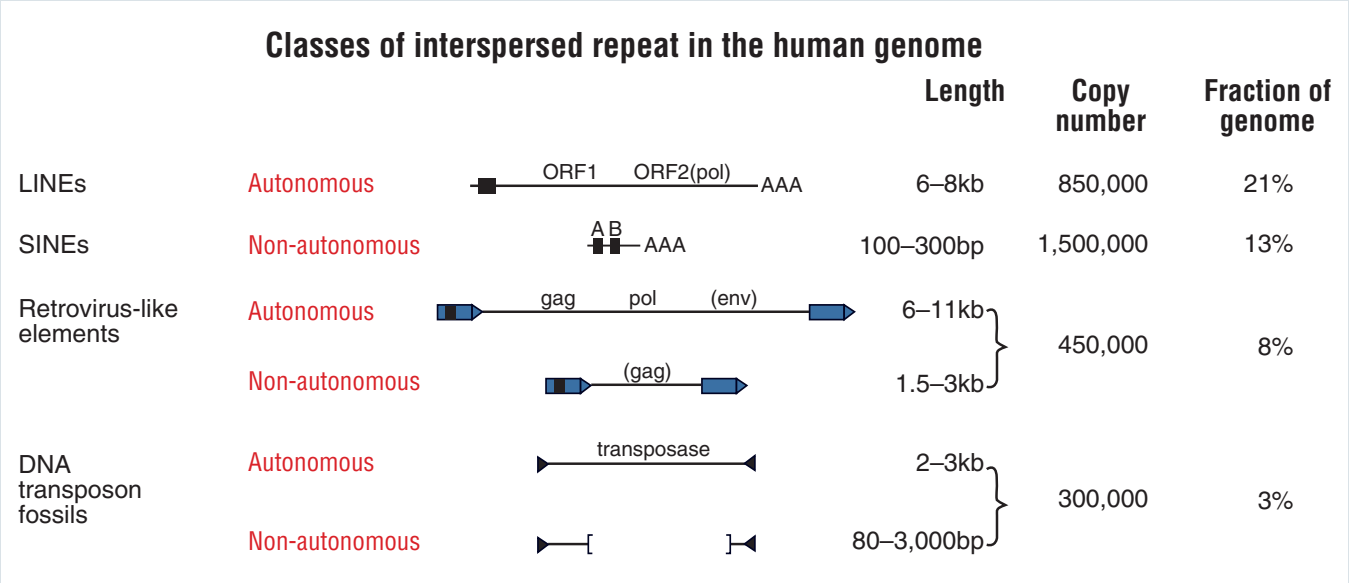


Figure 1: Classification of mammalian transposable elements (cited from Supplement of Nature 30 August 2001 Japanese edition)

mechanism of epigenetic regulation of gene expression has been elucidated and methylation of histone and DNA is confirmed to be the main mechanism of epigenetic regulation of gene expression. It is one of key issues of life sciences research to understand human health and diseases in terms of epigenetic regulation. We have dem-

onstrated that ERV gene expression in mice was inhibited by histone methylation, an epigenetic regulatory system. ERVs in humans are considered to have no activity to transpose. However, there are still many transcriptionally active copies and it is possible that they have effects on expression of (many) genes located adjacent to ERVs. Therefore,

it is possible that histone methylation-mediated regulation of ERV gene expression affects gene expression in various cells also in humans, and is involved in a variety of biological phenomena and diseases. Further studies are expected to elucidate the molecular mechanism.

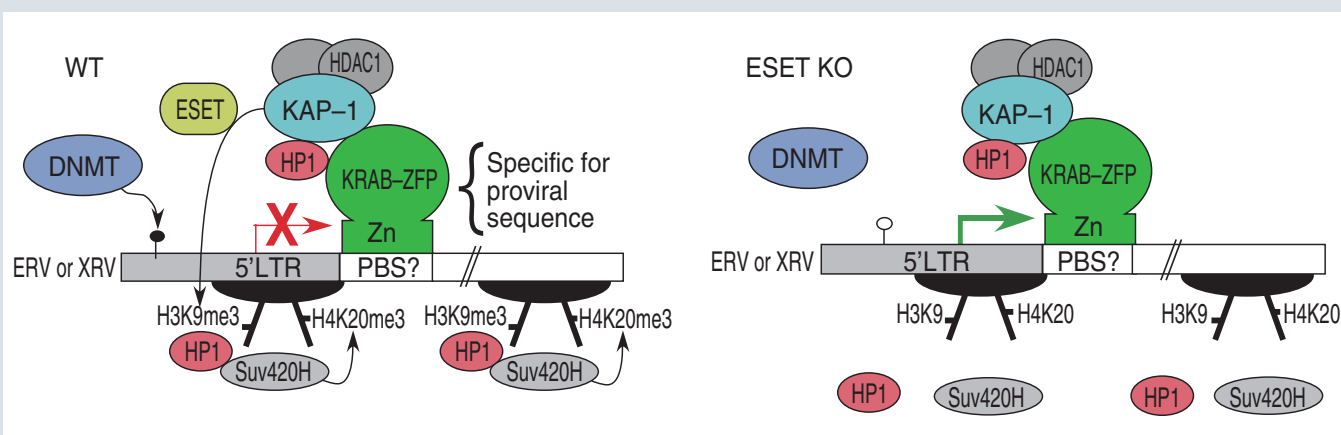


Figure 2: Mechanism of transcriptional repression of ESET to endogenous retroviruses in ES cells

Yoichi SHINKAI

- Born in 1961
- Field of specialization: Molecular Biology
- Completed doctoral program, Graduate School of Medicine, Juntendo University
- Ph.D., Juntendo University
- Professor, Institute for Virus Research, Kyoto University
- URL <http://www.virus.kyoto-u.ac.jp/Lab/mousemodel.htm>

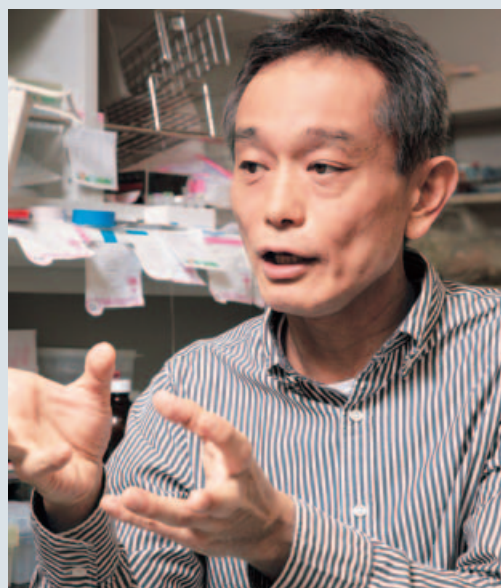
The driving force behind my research is “to elucidate unknown issues.”

As a boy, Professor Yoichi Shinkai loved living things and was particularly interested in the mechanisms of biological phenomena, i.e., “How do they live?” When he found out that DNA regulates biological phenomena, especially genetic issues, in his high school biology class, he decided to study molecular biology, which was a developing field in those days. It was around the time that recombinant DNA technology had begun to attract much attention and the Molecular Biology Society of Japan had just been established.

After he finished his graduate studies in 1990, he conducted basic research in Columbia and Harvard Universities for about 5 years. Afterwards he decided that it was “time to work as an independent researcher,” and this landed him a job in an institute run by an international pharmaceutical company in Japan where he did research on telomeres, a basic study related to development of new anticancer agents, for about 3 years. Professor Shinkai recalled that “in that institute, I built a network of people engaged in drug discovery as applied research and learned how to approach issues in research. What I gained during that time has helped me in my current study. More importantly, that is where I found the seeds of my current studies.”

His findings are expected to contribute to studies in ES and iPS cells, with potential to provide new directions in the search for a cure for various diseases and aging and to observe the evolutionary process in application to

plant genetic research, etc. “Recent researches have repeatedly found that so-called ‘junk DNA’ has an unexpected function, although most researchers previously overlooked it.” Professor Shinkai comments with a wide smile.





Carl CASSEGARD

- Born in 1971
- Field of specialization : Sociology
- Completed a Ph.D. Program at the Faculty of Social Sciences, Lund University
- D.Litt., Kyoto University and Ph.D., Lund University
- Senior Lecturer, University of Gothenburg

Some social movements I saw in Japan are very unique in the world. For me, one year in Japan was extremely rewarding and I enjoyed it fully.

Since his childhood, Dr. Carl Cassegard has loved reading books, particularly those on history. He first majored in history at Lund University graduate school, but after completing the course, he decided to study sociology. He thought that he would be able to study society and people more extensively in the sociology course. Some ten years ago, he became a recipient of a scholarship from Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT), he began studying at Kyoto University graduate school on the issue of how present Japanese society is depicted in contemporary literary works. He obtained his doctorate from Kyoto University, where he wrote a dissertation that analyzed the works by four contemporary writers, including Haruki Murakami. "Since my mother is Japanese, I have often visited Japan," Dr. Cassegard explained. "Each time that I visited," he continued, "I was inspired by many aspects of Japanese society that were different from Europe. Based on these experiences, I decided to study Japanese society through literary works."

Dr. Cassegard became increasingly interested in local social movements. In August 2009, he returned to Kyoto University for one year as a postdoctoral fellow of the Japan Society for the Promotion of Science (JSPS). This time, his study is on the Japanese "precariat (precarious workers)" movements. When he began a survey on this theme, he found that the definition of "precariat" in Japan differs from that in Europe. Whereas in Europe "precariat" refers to the unemployed and irregular workers, in Japan, the same term also includes the so-called NEET (young people Not in Education, Employment or Training) and stay-at-home individuals. In other words, while European researchers regard precariat problems as issues related to labor markets, Japanese counterparts consider the problems more extensively. "I believe that it is extremely rare in the world to address the issue of individuals who withdraw from society and to encourage them to go out of their private world," said Dr. Cassegard. "While engaged in this survey, I found that my own concept of 'Public Sphere,' which I had taken for granted, was being challenged. My year at Kyoto University has been immensely rewarding," commented Dr. Cassegard, indicating his great satisfaction in his achievements at the University. The presentation of his research outcomes is keenly awaited.

The Quest for Freedom

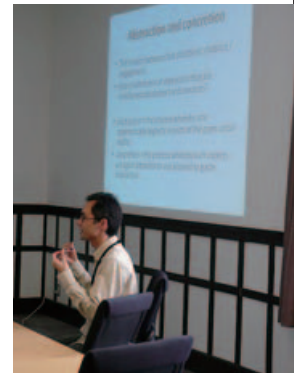
Soon a year will have passed since I came to Kyoto to study social movements. It's been an immensely rewarding year. To be based here at this university has been particularly inspiring and helpful not only because of the stimulating discussions with other researchers or the activists, circles and unions active here, but also because of the free and wonderfully liberal atmosphere of the university itself. I enjoy seeing the grand and colorful standing signboards (*tatekan*) along the walls leading up to the campus entrances. The common sight of students rehearsing theatre or music also contributes to an air of freedom of which I think the university should be proud of.

Although the main object of my research is the movement of irregular workers that has gained ground in Japan in the last five to six years, I have also been able to observe and participate in many other activities that make up civil society in Japan today. These include listening to former "comfort women", watching former homeless people dance and perform picture-card shows (*kamishibai*) in Osaka, and following the defenders of the homeless community in Miyashita Park in Tokyo. What has struck me most deeply has been the happiness people could achieve when they are able to make their voices heard and influence surrounding society. Regardless of the issue at stake, there is something about empowered people and their quest for freedom, independence and dignity which I believe strikes a deep chord in most people. Conversely, most of us are seldom so sad as when we see a person broken or without hope.

Recently, I have become interested in the concept of play and how it contributes to empowerment, to the strengthening of people's self-confidence as political actors. Play is not the opposite of reality, as many think, but the opposite of powerlessness. It's a state where things are felt to respond, when participants feel that this mutual responding decides over reality instead of the other way round. As the precarity movement shows with its street parties and happening-like performances, play does not have to be confined to secluded spaces like home parties or amusement parks. In rare moments, described by the Situationists as a "re-insertion of all things into

play", society as a whole takes on the appearance of being malleable, and its semblance of being an overpowering machinery falls away. The playfulness we see in much activism today is not a superficial "cultural" addition to politics, but directly related to empowerment itself.

While this playfulness can appear immature to some outside beholders, it is also important for the sake of democratic training. Speaking up against superiors, organizations or governments is perhaps the best education for democracy (by which I do not mean simply majority rule, but a society in which everyone counts). In Sweden, where I come from, there are today networks of activists, doctors and lawyers for hiding refugees and helping them avoid deportation. Such networks are usually treated unkindly in the mass-media because of the trouble they cause authorities. But when I see them I can't help thinking that people like them helped the Jews escape Hitler sixty years ago. Saying this I am not implying that society today is comparable to the nightmare of that earlier period. The point is that we will never know when the powerful becomes too powerful or when someone will be unjustly treated. When that happens we will need people who know how to protest and I am happy to see many such people around me today.



The Workshop on Psychological and Sociological Perspectives on Japanese Youth Issues, Kyoto University 12th of June 2010



Giant puppet from the "Dispersal and Disobedience" May Day demonstration in Kyoto 2010

One attractive feature of fieldwork at Kyoto University is that we can study freely, taking our original approaches to make studies rewarded.

Although Kyoto University is engaged in research activities in a wide variety of academic fields, the university is recognized as one of the leading global academic institutions of higher learning particularly in anthropology, ecology and other sciences based on fieldwork. Researchers in these academic fields conduct fieldwork in various parts of the world, making steady efforts in day-to-day survey activities and analyzing important data that they have obtained through such daily efforts. Dr. Yuuki Kawabata is one of such researchers. Using bio-logging technology, he conducts fieldwork on marine creatures and their behaviors on and around Ishigaki Island, which is located close to Japan's westernmost border.

■ Dr. Kawabata, I understand that you entered the Faculty of Agriculture at Kyoto University in 2001. Why did you select that faculty?

Since my childhood, I have loved fishing and swimming in rivers and in the sea. I was particularly interested in aquatic creatures. I selected the Faculty of Agriculture because I heard that it attaches importance to fieldwork. When I was in a senior high school, molecular biology was very popular. At first I was also interested in that subject, but I soon found that it was more like chemistry and physics, rather than biology. I was more interested in studying individual creatures and so I decided to enter the Faculty of Agriculture.

■ What kind of research activities are you engaged in on Ishigaki Island?

In addition to fieldwork, I conduct indoor experiments using aquariums to search for factors that validate my findings in fieldwork. I then do fieldwork once again to verify the data gained from my indoor experiments. In other words, I conduct experiments to study the data I obtained through bio-

logging, and verify the outcomes of experiments in natural settings by using the bio-logging technology once again. For instance, the fish called blackspot tuskfish (*Choerodon schoenleinii*) has a habit of digging into the sandy seabed below hard objects like corals, to hide itself beneath them. When we put fries of artificially-hatched blackspot tuskfish into an aquarium together with their predators, the fries are eaten almost immediately. However, when we put the young fish in the same aquarium after letting them learn how to dig into the seabed and hide themselves, the percentage of their survival improved, at least in our experiments. We conducted similar experiments in natural habitat to confirm that young fish that have learned to dig into the sandy seabed are less vulnerable to predators.

■ Do such experiments have any practical meaning? In what way do they benefit us?

I hope that my research will be helpful when Fisheries Research Agency releases young artificially-hatched blackspot tuskfish into the sea. If it releases young fish without "teaching" them how to dig into the seabed, these become extremely vulnerable to predators. We need to develop various measures to prevent the unnecessary loss of their lives.

■ I assume that you have to invent many items, based on your inspirations and ideas.

Certainly. Inspirations and good ideas are essential for conducting experiments in aquariums. To make experiments rewarding, you need good ideas in the first place. This is true of bio-logging, too.

■ On what occasions do you feel excited, and feel that your efforts have been rewarded?

Well, I feel happy when I am able to obtain the



Yuuki KAWABATA

- Born in 1983
- Completed doctoral program, Graduate School of Informatics, Kyoto University
- Ph.D., Kyoto University

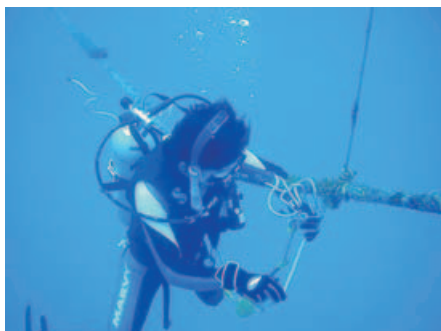
data that support my hypothesis. Even though local fishermen have long believed that blackspot tuskfish dig into the seabed, this was never scientifically confirmed. So I was rather excited when I first saw a video film showing the fish digging into the seabed. As for feeling that my efforts have been rewarded, well, that's how I feel when my research outcomes are accepted by people outside academic circles. When Fisheries Research Agency decided to employ the young fish releasing method that I recommended, and actually released young fish that way. I feel my efforts have been rewarded, even though I know that I have to wait and see the results of the release before rejoicing.

■ Do you believe that the way you have developed for releasing young blackspot tuskfish is also applicable to other species?

Certainly. Hawksbill turtle (*Eretmochelys imbricata*), for instance, also hides itself under corals. But those in captivity do not do so well. The training method that I have invented for blackspot tuskfish may be applicable to other shelter-dwelling species, such as hawksbill turtles.

■ Finally, please talk about your future research plans.

I am interested in how fish recognize their predators. Artificially hatched fish and young fish in captivity do not know "who are predators?" I want to know how they learn this vital information. Do they learn it by observing other fish being eaten? There are many different types of predators. Some look like a predator, but actually they are not. So I want to know how fish recognize their predators and learn to avoid them.



Attaching a receiver to a rope of the float



Implanting an ultrasonic transmitter in the abdominal cavity of a blackspot tuskfish

Present State and Future Vision of K.U.PROFILE (Kyoto University Programs for Future International Leaders)

K.U.PROFILE (Kyoto University Programs for Future International Leaders) is Kyoto University's initiative under the Japanese government's Project for Establishing Core Universities for Internationalization (Global 30, G30), for which the university was selected in 2009.

K.U.PROFILE aims to enhance the educational environment and opportunities for international students at Kyoto University by offering a range of eleven master's, doctoral and professional programs, and one undergraduate program, all of which are taught entirely in English. Ultimately, K.U.PROFILE aspires to educate the next generation of specialists who will provide solutions to current global problems in areas such as energy, the environment and life sciences.

International faculty have been specially recruited to teach the K.U.PROFILE courses. The first of the courses to commence was the Special Course in Agricultural Science at the

Graduate School of Agriculture in April 2010. Courses in the Graduate Schools of Energy Science, Informatics and Global Environmental Studies followed in October 2010. Applicants are also currently being selected for Kyoto University's first all-English undergraduate course: the Global Engineering Course in the Faculty of Engineering, which commences in April 2011.

In addition to increasing the number of international students at Kyoto University, K.U.PROFILE also aims to enhance the international awareness of all our students by offering short-term international exchange opportunities in

various faculties and graduate schools throughout the university. Additionally, Kyoto University established one of eight overseas offices for shared utilization by Japanese universities, which are being established in various countries by G30 universities. The office opened in Hanoi, Vietnam in September 2010, and will provide comprehensive information on Japanese universities to students in Vietnam, and support Japanese universities in their recruitment activities.

Details on K.U.PROFILE are available at our website:

<http://www.opir.kyoto-u.ac.jp/kuprofile/e/>



K.U.PROFILE class in the Graduate School of Agriculture

International Exhibition for Higher Education in Riyadh, Saudi Arabia

January 26–29, 2010

A delegation from Kyoto University headed by Executive Vice-President Shuzo Nishimura attended the International Exhibition for Higher Education in Riyadh, Saudi Arabia on January 26 to 29, 2010. The International Exhibition for Higher Education is an academic fair organized by the Ministry of Higher Education of Saudi Arabia, which aims to promote student recruitment and inter-university networking. The

exhibition was attended by representatives from 382 academic institutions from thirty-three countries.

Kyoto University operated a booth at the exhibition, from which the delegates provided information about the university and its courses to prospective students and other interested parties. The Kyoto University booth attracted a great many visitors during the event, particularly from young Saudi Arabian students and

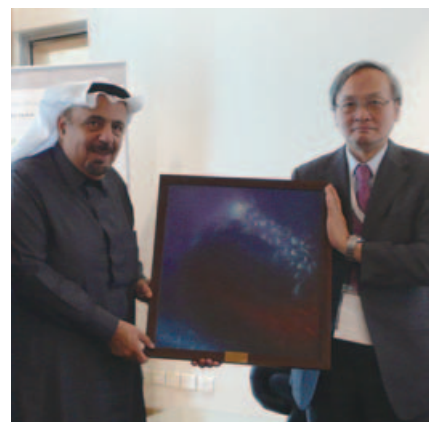
researchers interested in furthering their academic careers in Japan. On the third day of the event, Executive Vice-President Nishimura delivered a presentation as part of the exhibition's scientific program, which focused on Kyoto University's efforts to provide high-quality programs for international students and the university's plans for research on solar power satellites.

In addition to promoting Kyoto

University to students and researchers, the exhibition also provided an excellent opportunity for the university to deepen its relationships with Saudi Arabian institutions. The delegates engaged in productive meetings with representatives from several prominent universities, including King Saud University, King Faisal University and King Fahd University of Petroleum and Minerals among others. During the meetings the delegates discussed the possibilities for various forms of academic exchange and cooperation.

As well as meeting with many university delegates, Executive Vice-President Nishimura also had an opportunity to meet with the Saudi Arabian Minister of Higher Education, Dr. Khalid Bin Mohammad Al-Angari, to discuss the enhancement of cooperation between Kyoto University and academic institutions in Saudi Arabia.

The groundwork laid by the visit is anticipated to lead to a productive deepening of relations between Kyoto University and several Saudi Arabian institutions.



Executive Vice-President Shuzo Nishimura receives a commemorative gift from Dr. Khalid Bin Mohammad Al-Angari, Saudi Arabian Minister of Higher Education

The 14th Kyoto University International Symposium

June 24–27, 2010

The 14th Kyoto University International Symposium (KUIS-14): “High Resolution Digitization of Asian World Heritage” was held at the Xi’an Garden Hotel Tang Hua in Xi’an City, China on June 24, 2010. The symposium focused on research into the high resolution digitization of Asian cultural heritage and provided a showcase for the state-of-the-art digital imaging technology being developed at Kyoto University’s Graduate School of Engineering. The symposium was held in cooperation with Xi’an Jiaotong University, and was sponsored by the Kyoto University Foundation in collaboration with the Ministry of

Education, Culture, Sports, Science and Technology of Japan’s Special Coordination Funds for Promoting Science and Technology. The event was attended by approximately 80 participants.

The symposium began with an overview by Professor Ari Ide-Ektessabi of the Graduate School of Engineering, which was followed by a welcome address by Vice-President Zhuangde Jiang of Xi’an Jiaotong University, and an opening speech by Executive Vice-President Kiyoshi Yoshikawa of Kyoto University. The program featured presentations and discussion sessions focusing on the tech-

nology for high resolution digitization of cultural assets, and projects to create an international infrastructure to use that technology for the preservation, repair and utilization of Asian cultural heritage. Presentations were given by ten presenters from various countries, including Korea, Italy and the Great Britain.

Kyoto and Xi’an have had a Friendship City relationship since 1974, and at the reception, hosted by Kyoto University after the symposium, a letter of appreciation addressed to President Zheng Nanning of Xi’an Jiaotong University from Mr. Daisaku Kadokawa, the Mayor of Kyoto City was delivered to Vice-President Zhuangde Jiang by Professor Tetsuo Sawaragi, Assistant to the Executive Vice-President of Kyoto University.

On June 25 to 27, the symposium participants were given the opportunity to see the digitization and preservation of cultural heritage in practice on field trips to the Shaanxi History Museum, the Han Yangling Museum, and the Dunhuang Academy and the historic Mogao Caves in Dunhuang.



Presentation session



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P R O M E N A D E

京都逍遙

鞍馬の
火祭

The Fire Festival of Mt. Kurama: Spectacular and unique event featuring blazing torches against the night sky

Mt. Kurama, located about 8 kilometers north of Kyoto University's Yoshida Campus, is associated with a tragic national hero, Minamoto no Yoshitsune (1159-1189), a younger brother of the first Shogun of the Kamakura Shogunate Government, Minamoto no Yoritomo. Yoshitsune assisted his brother tremendously by fighting in a series of battles, contributing greatly to the national unification led by his brother. Despite his great achievements, Yoshitsune had to spend the rest of his life in exile as an outlaw. When he was finally cornered, he committed suicide to avoid capture and execution by his own brother. His tragic destiny made him one of the most popular heroes in Japan. According to legend, as a young boy, he practiced swordsmanship on Mt. Kurama with the fabled "Tengu" – winged goblins with faces of crows, or men with very long noses.

The Fire Festival originated with an event in 940, when Emperor Suzaku decided to relocate the Yuki Shrine, which was situated inside the Imperial Palace at that time, to Mt. Kurama. By doing so, the Emperor intended to ask the Shrine deity to guard the northern border of the capital city from invasion by evil spirits, which were considered to be responsible for natural disasters and armed conflicts. The relocation of the shrine deity was a grand and spectacular event. On that night, people holding torches made a long procession, as long as one kilometer. Burning braziers on tripods also dotted the way along the route. Ever since then, residents of Kyoto have observed the Fire Festival annually on October 22, to convey the grandeur of the event to from one generation to another. At 6:00 p.m. on that evening, residents along the route set burning braziers in front of their houses. People carrying burning torches also march around the neighborhood in a procession that becomes longer and longer as more and more people join it. The Festival reaches its climax around 8:00 p.m., when more than one hundred torch-bearing participants gather in front of Kurama Temple's gate at the foot of Mt. Kurama. On the Festival night, the entire town seems to be enveloped by burning flames. During the Festival various rituals are also performed, including those featuring women's prayers for a safe delivery and a rite of passage from boyhood to manhood. Since some rituals contain unusual performances, the Fire Festival is recognized as one of the three most unique festivals in Kyoto.



The Festival reaches its climax when young people bearing large and small torches gather in front of Kurama Temple's gate.

The site of Tokobo Hall, where Minamoto no Yoshitsune supposedly studied Buddhism when he was a young boy.



The oratory of Yuki Shrine, rebuilt in 1607 by Hideyori Toyotomi, the then Minister of the Imperial Court (Important Cultural Property)



The approach to Yuki Shrine is surrounded by tall cedar trees, which together create an awe-inspiring and mysterious atmosphere.

A figure of Tengu goblin welcomes tourists at the foot of Mt. Kurama.

